Detectability of Habitable Planets with the Space Interferometry Mission

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The Space Interferometry Mission (SIM) has design specifications that call for an astrometric precision of 1 microarcsecond. This precision would allow for the detection of planets down to a few earth masses within the solar neighborhood. If the Sun were viewed from 10 pc away, then the Earth would cause an astrometric wobble of 0.6 microarcseconds. A terrestrial planet with 7 M_e (Earth masses) at 1 AU would produce a reliably detectable (4σ) signal, with SIM's unprecedented 1 microarcsecond precision. The focus of this poster is calculation of habitable zones (HZ) of stars to be studied by two SIM Key Science projects (PI's Mike Shao and Geoff Marcy). This work compares a radiative temperature calculation to energy transfer models that include approximations for the greenhouse effect, run-away glaciation, tidal locking, stellar evolution and other possible effects on the HZ. These calculations will help to guide the observation priority and the cadence of observations for targets in this SIM Key project and may be useful in evaluating the best targets for extreme adaptive optics, coronographic surveys and the Terrestrial Planetary Finder (TPF) mission.

The Second TPF-Darwin International Conference, San Diego, California, July 2004 Program and Abstracts